CLAIM AMENDMENTS

1. (Previously presented) A sensor for determining a concentration of carbon monoxide in a reducing gas stream as a function of a measured electrical property, said sensor comprising:

a. a substrate, said substrate having at least a first side and a second side, said substrate being non-conductive;

b. a first electrode, said first electrode deposited on said first side of said substrate, said first electrode adapted to conduct electricity;

c. a second electrode, said second electrode deposited on said first side of said substrate so as to not contact said first electrode, said second electrode adapted to conduct electricity; and

d. a sensing material, said sensing material in electrical contact with said first electrode and said second electrode, said sensing material comprising a majority of cuprous chloride (CuCl), said sensing material capable of selectively adsorbing carbon monoxide from said reducing gas stream, said sensing material having an electrical property that varies in relation to said adsorbed carbon monoxide on said sensing material.

2. (Original) A sensor according to claim 1 wherein said substrate is alumina.

3. (Original) A sensor according to claim 1 wherein said first electrode is an interdigital electrode.

4. (Original) A sensor according to claim 1 wherein said second electrode is an interdigital electrode.

5. (Canceled)

6. (Canceled).

7. (Previously presented) A sensor according to claim 1 wherein said sensing material comprises a minority of a copper halide wherein said copper of said copper halide has a valence of at least +2.

8. (Original) A sensor according to claim 1 further comprising a heater deposited on said second side of said substrate, said heater adapted to maintain said sensor at a substantially constant temperature.

9. (Original) A sensor according to claim 8 wherein said heater is a thick-film platinum heater deposited on said second side of said substrate.

10. (Original) A sensor according to claim 1 wherein said electrical property is selected from the group consisting of: resistance, impedance, capacitance, inductance, conductance, voltage and current.

11. (Previously presented) A method for using a sensor to determine a concentration of carbon monoxide in a reducing gas stream, said method comprising the steps of:

a. passing said reducing gas stream to a sensor, said reducing gas stream being reducing in nature and containing CO and H_2, said sensor comprising:

i. a substrate, said substrate having at least a first side and a second side, said substrate being non-conductive;

ii. a first electrode, said first electrode deposited on said first side of said substrate, said first electrode adapted to conduct electricity;

iii. a second electrode, said second electrode deposited on said first side of said substrate so as not to contact said first electrode, said second electrode adapted to conduct electricity; and

iv. a sensing material in electrical contact with said first electrode and said second electrode, said sensing material comprising a majority of cuprous chloride (CuCl), said sensing material capable of selectively adsorbing carbon monoxide from said reducing gas stream, said sensing material having an electrical property that varies in dependence upon said adsorbed carbon monoxide on said sensing material;

b. impressing a potential across said first electrode and said second electrode;

c. measuring said electrical property of said sensing material; and

d. outputting said measured electrical property to a device.

12. (Original) The method according to claim 11 wherein said device is a display device adapted to provide a read-out of said carbon monoxide concentration based upon said measured resistance.

13. (Original) The method according to claim 11 wherein said device is a controller adapted to adjust said gas stream in response to said output measurement.

14. (Original) The method according to claim 11 wherein said electrical property is selected from the group consisting of: resistance, impedance, capacitance, inductance, conductance, voltage and current.

15. (Previously presented) A method for sensing a concentration of carbon monoxide while converting a hydrocarbon fuel into a reducing gas stream, said method comprising the steps of:

a. reacting a flow of gases to produce a gaseous mixture of hydrogen (H_2), carbon dioxide (CO_2), carbon monoxide (CO), nitrogen (N_2), and water (H_2O);

b. directing said gaseous mixture to at least a first reactor, said at least first reactor adapted to reduce carbon monoxide content and increase said hydrogen content, thereby forming a flow of reformate gas;

c. directing said reformate gas to at least a second reactor, said at least second reactor adapted to combine a flow of air with said flow of reformate gas so as to oxidize said carbon monoxide to carbon dioxide and so as to not oxidize said hydrogen to water;

d. directing said flow of air and reformate gas to a sensor, said sensor comprising:

i. a substrate, said substrate having at least a first side and a second side, said substrate being non-conductive;

ii. a first electrode, said first electrode deposited on said first side of said substrate, said first electrode adapted to conduct electricity;

iii. a second electrode, said second electrode deposited on said first side of said substrate so as not to contact said first electrode, said second electrode adapted to conduct electricity; and

iv. a sensing material in electrical contact with said first electrode and said second electrode, said sensing material comprising a majority of cuprous chloride (CuCl), said sensing material capable of selectively adsorbing carbon monoxide from said flow of air and reformate gas, said sensing material having an electrical property that varies in dependence upon said adsorbing carbon monoxide on said sensing material; and

e. providing feedback to said at least second reactor, said at least second reactor further adapted to adjust said flow of air in response to said measured concentration of said carbon monoxide.

16. (Original) A method according to claim 15 further comprising the step of: diverting said oxidized flow of air and reformate gas from said next device when said concentration of carbon monoxide detected by said sensor exceeds a threshold.

17. (Original) A method according to claim 16 wherein said next device is chosen from the group consisting of: PEM fuel cell and storage tank.

18. (Original) A method according to claim 15 further comprising the step of: directing said oxidized flow of air and reformate gas to a next device.

19. (Original) A method according to claim 18 wherein said next device is chosen from the group consisting of: PEM fuel cell and storage tank.

20. (Original) A method according to claim 15 wherein said electrical property is selected from the group consisting of: resistance, impedance, capacitance, inductance, conductance, voltage and current.

21. (Currently amended) A sensor that can selectively detect a concentration of carbon monoxide in a hydrogen-containing gas stream devoid of oxygen, said sensor comprising a sensing material <u>having a lamellar structure,</u> wherein a majority of said sensing material is cuprous chloride (CuCl).

22. (Original) A sensor according to claim 21, wherein said concentration of carbon monoxide is between about 10 to about 2000 part per million.

23. (Original) A sensor according to claim 21, wherein said hydrogen-containing gas stream is a reformed fuel gas stream.

24. (Original) A sensor according to claim 23, wherein said reformed fuel gas stream comprises carbon monoxide, carbon dioxide, hydrogen and nitrogen.

25. (Currently amended) A sensor for selectively measuring a concentration of carbon monoxide in a hydrogen-containing gas stream devoid of oxygen, where said sensor comprises a sensing material comprising a majority of cuprous chloride (CuCl) ~~copper chloride~~ that undergoes a reversible change in at least one electrical property only when carbon monoxide is present.

26. (Cancelled)

27. (Original) A sensor according to claim 25, wherein said at least one electrical property is resistance, impedance, capacitance, inductance, conductance, voltage or current.

28. (Currently amended) A sensor according to claim 25 operated at a temperature to promote said reversible change in said at least one electrical property of said cuprous chloride ~~metal halide~~.

29. (Previously presented) A system for determining a concentration of carbon monoxide in a gas stream as a function of a measured electrical property, said system comprising:

a. a conduit, said conduit containing a flow of reducing gas, wherein said reducing gas comprises said carbon monoxide; and

b. a sensor disposed in said conduit, said sensor comprising:

i. a first electrode adapted to conduct electricity;

ii. a second electrode adapted to conduct electricity, wherein said first electrode and said second electrode do not physically contact one another; and

iii. a sensing material, said sensing material in electrical contact with said first electrode and said second electrode, said sensing material comprising a majority of cuprous chloride (CuCl), said sensing material capable of selectively adsorbing said carbon monoxide from said flow of reducing gas, said sensing material having an electrical property that varies in relation to said adsorbing carbon monoxide on said sensing material.

30. (New) The sensor according to claim 1 wherein said sensing material has a lamellar structure.

31. (New) The sensor according to claim 1 wherein said lamellar structure comprises laminae of spherical crystals.

32. (New) A sensor for determining a concentration of carbon monoxide in a reducing gas stream as a function of a measured electrical property, said sensor comprising:

a. a substrate, said substrate having at least a first side and a second side, said substrate being non-conductive;

b. a first electrode, said first electrode deposited on said first side of said substrate, said first electrode adapted to conduct electricity;

c. a second electrode, said second electrode deposited on said first side of said substrate so as to not contact said first electrode, said second electrode adapted to conduct electricity; and

d. a sensing material, said sensing material in electrical contact with said first electrode and said second electrode, said sensing material comprising a majority of a metal halide having a lamellar structure, said sensing material capable of selectively adsorbing carbon monoxide from said reducing gas stream, said sensing material having an electrical property that varies in relation to said adsorbed carbon monoxide on said sensing material.

33. (New) The sensor according to claim 32 wherein said metal halide is cuprous chloride (CuCl).

34. (New) The sensor according to claim 32 wherein said lamellar structure comprises laminae of spherical crystals.

35. (New) The sensor according to claim 32 wherein said sensing material additionally

comprises a minority of a copper halide, wherein said copper of said copper halide has a valence of at least +2.